The structure of bank supervision and corruption in lending: a study for transition economies

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Statement of Authorship

"University of Paris 1 Pantheon Sorbonne does not intend to give any approval or disapproval to the opinion issued in this master thesis, they must be regarded as the property of the author."

For my parents,

Paris, 12th June 2012

Zenathan Adnin HASANNUDIN

Abstract

This paper try to examine the relation between the structure of bank supervision and corruption in lending based on the data from 21 transition economies in Eastern Europe and Central Asia. We support Beck, Kunt, and Levine (2006) that higher supervisory power will increase the degree of corruption in lending while supervisory policies which promote private monitoring by pushing banks to disclose accurate information and give incentives to private agents to monitor bank will reduce the degree of corruption in lending. As the main finding in this paper, we prove that the structure of bank supervision has significant effect to corruption in lending. More specifically, we found that the degree of corruption in lending will increase when the bank supervisor function is not in the central bank. We also have found that after we control our model with various country-level variables, the higher independency of bank supervisor will decrease the degree of corruption in lending.

Keyword: *Bank Supervision, Central Bank, Corruption*

Contents

Chapter 1: Introduction

In these recent days, banks around the globe are one of the primary sources of external finance through their ability to lend money for enterprises. Efficient banking system would be able to channeling and monitoring savings to the most productive investment project and furthermore increase the performance of economies. The importance of efficient banking system which can be influenced by variety of economic, regulatory, and institutional factor (Barth, Caprio and Levine, 2004) and how the efficient banking system have a big impact on economic development by reducing income inequality and poverty (Levine, 1997 and 2005) are the main focus for research in this area.

Although policymakers always try to create institutional environment which promote efficient banking system, the presence of corruption in lending could prevent it to operate efficiently. Corruption in lending impedes the ability of firms to raise external finance because it acts as a tax that increases the cost of the loan to the borrower. The scope of problem from corruption in lending were described by Batra, Kaufmann and Stone (2004) which show that based on the survey findings, 20–30% of firms in non-OECD countries consider corruption of bank officials a major or moderate obstacle to their businesses.

Despite its importance, there has been limited research regarding the cause and consequence of corruption in bank lending. Measuring bank corruption is the main difficulties which explain relatively lack of work in this area. Notably, there are only three papers that closely work in the area of corruption in bank lending.

The first paper is written by Beck, Demirguc-Kunt, and Levine (2006, Beck et al. hereafter) which discuss the relation between corruption in bank lending and bank supervisory power. Beck et al. (2006) find that stronger bank supervision has positive correlation with more corruption in lending. In contrast, they promote private monitoring and transparency in the bank activity to reduce the level of corruption. Based on their research, Barth, Caprio, and Levine (2006, Barth et al. hereafter) affirm this finding that stronger bank supervision will lead to higher corruption.

The second work in this issue is Barth, Lin, Lin, and Song (2009) which observes that low level of corruption in lending could be achieved by greater competition and information sharing

among bankers. Both Beck et al (2006) and Barth et al. (2009) support similar arguments that instead of strengthening the supervisory power in the banking system, policymaker can better reduce the level of bank corruption by promoting competition and openness.

The last notable work is from Houston, Lin, and Ma (2010) who examine the effects of media ownership and concentration on corruption in bank lending. They find that the media state ownership and media concentration have positive effect to stronger supervisory power that lead to greater corruption in bank lending.

However, even though these studies give comprehensive discussion about corruption in lending, they primarily focus on the cross-country research in global scope. While we realize that there are differences among country group in the means of income level, development status, or geographic regions (Barth, Caprio, and Levine, 2001), we think that it would be interesting to make further research in smaller scope for transition economies for three reason. First reason because corruption in lending has become particularly serious problem in transition countries to the extent they lack adequate laws, objective courts, prudential regulations, and other appropriate institutions to sufficiently contain corruption (Weil, 2008).

Second, in these recent years the transition economies enjoy bigger role in the global economies with moderate and positive economic growth compared to developed economies, in some extent it is interesting to know how bank supervisor affect the corruption in lending which also have effect on their economics performance.

The last important reason is that we realize an increasing trend of policy maker to strengthen bank supervision in order to avoid banking crisis. Some influential international institutions such as the World Bank, IMF, and Bank for International Settlements even support this step (Beck,et al, 2006). The other trend are explained by Eichengreen and Dincer (2011) that there are changes in the structure of bank supervisor when the authority to supervised has been moved from central bank to new independent body, especially after UK launch Financial Services Authority in 1998. This pattern can be contradicted if they're proven ineffective to reduce the corruption in lending.

Therefore, the main motivation for this article is to provide more detailed research on the impact of the structure of banking supervision to corruption in lending for the transition countries in Eastern Europe and Central Asia which include 21 countries (Albania, Armania, Azerbaijan,

Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Turkey, and Ukraine)

This study is possible thanks to availability of extensive data from World Bank Economic Survey (WBES) which used by Beck et al. (2006), Database on Bank Regulation and Supervision which collected by Barth et al. (2006), and World Development Indicators as a comprehensive dataset from the World Bank.

Furthermore, in this study we try to develop what Beck et al. (2006) has done to more limited scope of transition economies. While we want to test whether the main result that stronger supervisory power may result higher rate of corruption in lending are still uphold for transition economies, we also want to determine the dominant factor that can affect the degree of corruption in lending sector. Furthermore, realizing the importance of the structure of banking supervision on economic performance (Eichengreen & Dincen 2011), we also want to know whether the choice of appointing central bank as bank supervisor or transfer this authority to another independent supervisor agency will have an effect to corruption in lending.

Econometrically, in this article we use probit regression method because the binomial nature of main dependent variable we use to measure the degree to which corruption of bank officials is an obstacle to firms raising external finance. To be more specific, in the all three main paper which mentioned above, the dependent variable is the response from specific question in the World Bank's World Business Environment Survey (WBES) which are, "Is the corruption of bank officials an obstacle for the operation and growth of your business?" Therefore, we remain use the response as the dependent variable on this article.

For the main explanatory variable, we follow Beck et al. (2006), Barth et al (2009), and Houston et al. (2010) which use various variables to measure supervisory power and also regulation that support transparency in banks and give incentive for private creditors to monitor banks. We also add more variable related to the choice of having central bank as supervisor and also the independency of the supervisor authority to measure the impact of structure in bank supervisor to corruption in lending.

The remaining of the paper is organized as follows. Section 2 presents previous studies on bank supervision and corruption in lending. Section 3 describes data sources, methodology, and key variables used in the analysis. The main empirical results are reported in section 4. Finally, section 5 summarizes the results and provides some concluding thoughts.

Chapter 2: Literature Review

2.1 The Importance of Bank Regulation and Supervision

Nowadays, we realize that the banking system has plays an important role to the economic performance of a country. In one hand, Levine (1997, 2005) shows through econometric studies that when banks manage to channeling capital to firms with the highest social returns and able to monitor the allocation of funds, this will encouraging entrepreneurship and economic growth. Furthermore, Levine (1997, 2005) also states that well-functioning banks will have positive effect to income distribution and poverty. Countries with better banks experience faster reductions in poverty as capital flows to those with the best projects, not simply to those with the most wealth and power, the reverse uphold for poor functioning banks. Thus, realizing that many people live in a country with poor performing bank, bank regulation and supervision matter to establish efficient banking system because banks has the ability to influence people to improve their living standards.

In the other hand, sounds bank regulation and supervision are important to minimize destruction from bank related financial crisis or other kind of failure in banking system. Caprio et al (2003) notes that the cost of bank related financial crisis were enormous which exceeded $1 trillion just for Chile and Argentina in 1980s and South East Asia in 1990s and estimated recovery cost surpassing 40% of GDP. While in the most recent crisis in 2007-2008, developed country like US, Spain, France, and Germany has spent public funds to financial sector which reached 20-30% of GDP (Schildbach, 2010). It is clear that failure in banking system has the ability to disrupt real economies and real cost to human, for example it will reduce funds for health and education as a cost to bailout banks. Therefore it is important to identify approach and scope of regulation and supervision which can best enhances bank performances to avoid banking crisis.

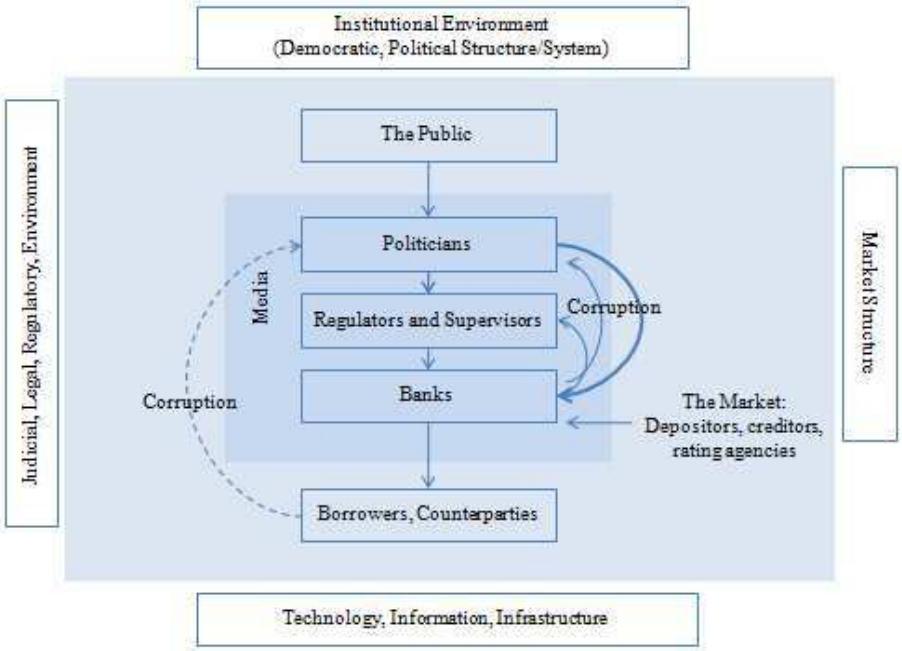
To regulate and supervised banks efficiently, each country have different approach and set of policy and the level of intervention are vary from “free banking” to highly interventionist regulations. Moreover, the debate on the bank regulation and supervision still become interesting issues which include scope of regulation on bank activities, barrier on entry and exit, capital requirements, supervisory power, availability of safety net, private monitoring, government

ownership on bank, and the Basel Committee and regulatory convergence (Barth, Caprio, Levine 2006).

When we study bank regulation and supervision, we also need to take into account various entities and surrounding environment influencing the operation of banks. Figure 1 tries to show broader framework to view bank regulation and supervision that involves a sequence relation with another agencies surrounded by various environment of political, legal, market structure, culture, and technological forces.

Institutional environment can determine the quality of checks and balances in the government that will influence politician behavior to act for the welfare of society or just private interest. Legal system shapes the extent of sound regulation and assures that the rules are followed by every agent to reduce corruption level. The level of information technology affects the flow of information about banks to other agent. Market structure define the concentration and competitiveness of banking industry and provide monitoring function either from other bank, depositor, creditor or rating agency so bank will behave properly. Furthermore, an independent media can play a key role in monitoring corruption and investigating agency problem that may occurs in every sequence.

Figure 1. Framework for Bank Regulation and Supervision



Source: Barth, Caprio, Levine (2006)

Figure 1 above also shows us the principal-agent problem in every step of relation caused by asymmetric information and different incentives among agent. For example in the lending relationship, the bank is principal and the borrower is agent, asymmetric information exist because borrower hold better information about their business while bank want them to behave responsibly in order to return their loan, thus usually bank demanding collateral and short maturity to minimize agency problem.

In the next level, bank managers who try to maximize their utility can act differently from rule and enforcement procedures of regulators and supervisors who have imperfect information. This agency problem continue to next level when politicians (including government officials) seek to influence bank regulators which have better information about bank activities and regulatory policy. Finally, the most difficult problem is when the public need to make politicians behave properly for the society because there is possibility that politician chooses to maximize their own interest. Barth, Caprio, and Levine (2006) mention that the ability of the public to monitor and control politicians has key implications for the selection and operation of bank regulations and supervisory practices, and hence will influence bank performance and economic prosperity.

Another important thing from the framework of bank regulation and supervision is complicated relation caused by possibility of corruption when agent tries to influence higher entities to influence the flow of funds (the upward pointing arrow). Wallis (2004) explains this problem when we need to considering the private interest of each agent which creates venal corruption. For example, borrower will try to influence politicians by bribe or lobby so regulators and supervisors so that the flow of fund from banks will favor those borrowers. More complicated relations describes as systematic corruption by Wallis (2004) is when politicians try to use their influence to maintain their political position by conspiring with bankers to channeling funds only to those supporting ruling party.

In the end, broader approach in studying bank regulation and supervision are necessary because each agent does not automatically behave properly to improve society welfare. Corruption is one important aspect that deteriorating the flow of funds from banks to prospective borrower with good projects and furthermore disrupts economic performance. For that reason, study in corruption in lending become important to help us better understand which approach we need in bank regulation and supervision to reduce the level of corruption.

2.2 Corruption in Lending

Beck, Demirguc-Kunt, and Levine (2006) as a pioneer research on corruption in lending, try to understand the role of supervisory agency policies which can influences the obstacle faced by firms in raising external finance.

In their research, Beck et al. (2006) try to prove conflicting theory as mentioned by Stigler (1971) when strong official supervision of bank can improve the corporate governance of banks, increase the efficiency of banking system as an intermediary and reduce corruption in bank lending. This "**supervisory power view**" stands because it is widely believe and supported by international institutions such as BIS, IMF, and World Bank that strong bank supervisor can effectively manage information cost, transaction cost, avoid banking crises, and replace the role of private agents which frequently lack the incentives and capabilities to monitor powerful banks.

An alternative to this view is "**political/regulatory capture view**" when politicians and supervisors do not maximize social welfare as mentioned by Shleifer and vishny (1998). If the supervisory agency are strong, there are tendency that politician will induce banks to divert the flow of credit to politically connected firms. This may cause inefficient credit allocation and may increase corruption in lending.

In the last view, "**private monitoring view**" argues that supervisory agency which has responsibility and authority on banking system should focus on enhancing the ability of private agents to access information and transaction cost. If supervisory agency can promote bank transparency to provide accurate information to the public, private agent can effectively monitor banks and reduce the possibility of corruption in lending. Nevertheless, to foster public information and reduce corruption of bank official, sound legal institution need to operate in the country.

To explain how supervisory agency can influence the corruption in lending, Beck et al. (2006) use data from World Business Survey (WBES) for firm level data and Barth, Caprio, and Levine (2006) for country level data on bank supervision. Using ordered probit model, the dependent variable is specific from response on following question: "Is the corruption of bank officials an obstacle for the operation and growth of your business?" Answer may vary between 1 (no obstacle), 2

(a minor obstacle), 3 (a moderate obstacle) and 4 (a major obstacle). Therefore, a higher value indicates more severe corruption in lending.

As the basis for independent variable, Beck et al. (2006) divides the variables into three categories. First are firm specific traits which include the ownership structure of the firms (percentage of government and foreign ownership), number of competitors, whether the firm is an exporter or not, main business of the firm (in manufacture or services), and sales of the firm. Second categories are independent variables for Bank Supervisory Policy which includes supervisory power and private monitoring. The last one is country level variables which includes growth, inflation, and amount of credit from banks to private sector. To sum up, the relation between bank supervision and corruption in bank lending can be assumed that the response of the firms follows this equation (where j and k subscripts indicate firm and country respectively):

$$
\begin{aligned}
&Bank\ Corruption = \\
&\alpha + \beta_1 Government_{j,k} + \beta_2 Foreign + \beta_3 Exporter_{j,k} + \beta_4 Competitors_{j,k} + \\
&\beta_5 Manufacturing_{j,k} + \beta_6 Services_{j,k} + \beta_3 Size_{j,k} + \beta_8 Inflation_k + \beta_9 Growth_k + \\
&\beta_{10} Priv_k + \beta_{11} Official\ Supervision_k + \beta_{12} Private\ Monitoring_k + \varepsilon_{j,k} \qquad (1)
\end{aligned}
$$

In the paper, Beck et al. (2006) has tried various measures and develops initial equation above to help them explain the relation between bank supervision and corruption in lending. These measures include the role of GDP per capita, economic crisis, rule of law and government effectiveness, country's latitude, ethnic fractionalization, and length of each country independency. In the end, they found consistent result that supervisory power always has positive value and significant, which means that if bank supervision agency has higher supervisory power, then bank corruption will increase. In the other hand, private monitoring variables has always negative value and statistically significant, which means that corrupt bank officials are less of a barrier to raising capital in countries where supervisory policies force banks to disclose accurate information and give private creditors the appropriate incentives.

Barth et al. (2009) demonstrates a different approach to analyze the determinant of corruption in lending by proving the beneficial role of competition and information sharing. They make some modification into initial equation to measure bank corruption from Beck et al. (2006) by adding new variables which proxy bank competition measure. The bank competition measures consist of

three important variables which are bank concentration on asset and deposit, standard concentration measure with Herfindahl-Hirschman-Index (HHI) and entry barrier of the firm. Therefore the equation which used by Barth et al. (2009) are as follows:

$$Bank\ Corruption = \alpha + \beta' Bank\ Competition\ Measures_{j,k} + \alpha_1 State_{j,k} + \alpha_2 Foreign_{j,k} + \alpha_3 Exporter_{j,k} + \alpha_4 Firm\ Size_{j,k} + \alpha_5 Industry\ Dummies_{j,k} + \theta' Macro\ Controls + \varepsilon_{j,k} \quad (2)$$

Beside bank competition measure, Barth et al (2009) also found that information sharing play important role as determinant variables of corruption in lending. Their theoretical model predicts that information sharing will reduce corruption in bank lending by reducing asymmetric information between borrowers and lenders, enhancing monitoring of bribery, and reducing the information rent and hence the bargaining power of lenders. They use two dummy variables as proxy of information sharing which are the existences of *public credit registry* and *private credit bureau.* Both variables collect information on the credit worthiness of borrowers but run by different entities. The second equations in their research, with addition of information sharing variables, are as follows:

$$Bank\ Corruption = \alpha + \beta' Bank\ Competition\ Measures_{j,k} + \delta' Information\ Sharing\ Measures_{j,k} + \alpha_1 State_{j,k} + \alpha_2 Foreign_{j,k} + \alpha_3 Exporter_{j,k} + \alpha_4 Firm\ Size_{j,k} + \alpha_5 Industry\ Dummies_{j,k} + \theta' Macro\ Controls + \varepsilon_{j,k} \quad (3)$$

The result of this research is quite in line with the result from Beck et al. (2006) which promotes private monitoring to reduce corruption in lending. They found that competition measures which measured by concentration level are positive and significant, this means that increased concentration (less competitive) results increasing level of corruption in lending. For the information sharing, they found that public credit registry variables are not significant while private registry bureau are significant. This empirical result shows that private bureau play a more effective role in reducing information gaps between lenders and borrowers.

Papers from Houston, Lin, and Ma (2010) examine further the determinant of corruption in lending by using a rather unique and different approach by add media ownership as independent variable. In their argument, media firms have natural incentives to report interesting news which

also include bank corruption. Therefore media monitoring system to bank officials increases the probability of being detected and punished, making media as potentially effective mechanism of external control on corruption in lending.

However, the hypothesis of this research is that when the media were concentrated and controlled by state, it will reduce the incentive for monitoring thus makes higher level of corruption in lending. This hypothesis is in line with political media capture view of Djankov, et al. (2003) which says that politicians or supervisors might suppress the government controlled media in reporting bank corruption case to entrench their position.

To provide a comprehensive analysis on the specific influence of media into banking corruption, Houston, Lin, and Ma (2010) based their research from Beck et al. (2006) and Barth et al. (2009), whom become the main reference of corruption in lending topic, and research from Djankov, et al. (2003) which examine and collect extensive measures regarding media ownership and concentration. Hence, they make modification of ordered probit model from Beck et al. (2006) by adding media ownership (ratio of government ownership on newspaper, radio and television) market competition, and press freedom index as key independent variables. The probit model in Houston, Lin, and Ma are as follows:

$$Bank\ Corruption = \alpha + \beta' Media\ State\ Ownership_j + \rho' Media\ Concentration_j + \theta' Banking\ Sector\ Controls_j + \gamma' Firm\ Controls_j + \delta' Industries\ Dummies_{j,k} + \varphi' Macro\ Controls_{\mathrm{j}} + \varepsilon_j \quad (4)$$

The most important finding from Houston et al (2010) is that media state ownership measure has a positive, highly significant coefficient, hence shows that increased state ownership of media results in greater corruption in lending. While concentration variables are positive and statistically significant, the paper also shows that competition in media provides stronger incentives for media firms to actively reporting newsworthy events such as bank corruption. The result of this paper therefore proven that stronger regulatory power and less competition might suppress media owned by government in reporting bank corruption case which makes the media less effective in monitoring corruption and might encourages corruption in bank lending.

2.3 The Structure of bank supervision

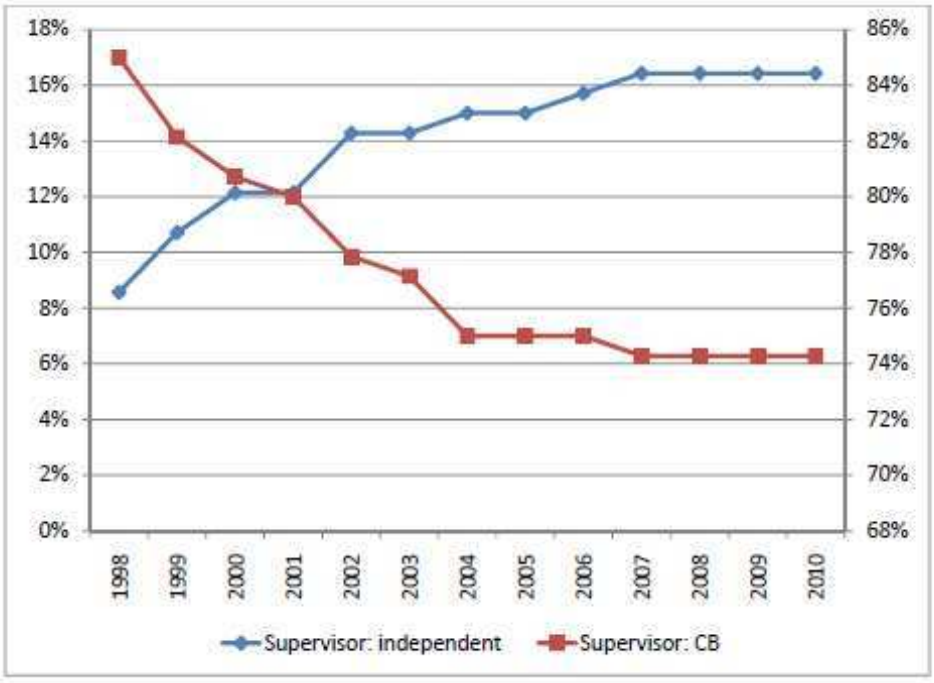
Many countries around the world have experienced banking crises in the past years and all countries are witnessing substantial changes in the structure and nature of banking system. Besides banking crisis, rapid technological changes and the globalization of banking, have led the policymakers to formulate better policies for the crucial role of bank regulation and supervision.

Policy discussions usually focus on three issues with respect to bank supervision that must be addressed in establishing and maintaining effective supervision which includes: the structure of banking supervision, the scope of supervision, and the independence of supervision (Barth et al. 2002). The first issues with respect to the structure of bank supervision are whether there should be a single bank supervisory authority, or multiple bank supervisors, and whether the central bank should play a role in bank supervision. The scope of supervision is another important issue whether there should be a single authority to regulate and supervise broader scope of financial service such as banking, securities, pension funds, and insurance. Finally, the independence issue concerns into the degree whether supervisory authority can make decisions and take actions without intervention of political process and manage to self fund their activity.

The argument for single supervisory or multiple supervisory and whether central bank should play the role of bank supervision can be found but not limited in Goodhart (2000) and Barth et al. (2002). Those who support to remove supervision from central bank and create independence institution argue that it would avoid conflicts of interest between supervisory responsibilities, monetary policy function to stabilize price and financial system. The increasing integration between bank and nonbank financial firms also urge central bank to transfer their supervisory responsibility because central bank mostly familiar with commercial bank. While the strongest argument for one supervisor under central bank is the advantage of gathering firsthand information in order to identify and respond to any problem in banking sector especially in credit crunch or crisis. One supervisor under central bank will also help central bank to better implement the lender of last resort functions. However, the latter argument was criticized by Goodhart (2000) because central bank, other supervisor, and finance ministries have invested effort to make sure coordination and cooperation in information sharing can work properly.

Before recent financial crisis in 2007-2008, the argument for independent bank supervisor outside central bank has gaining vast support. The establishment of British's Financial Service Authority (FSA) in 1997-1998 mark the serious action and gives example of moving bank supervision function from central bank to new independent authority. Figure 2. Show the trend of independent bank supervisors from 1998 - 2010 which show increasing number after the establishment of FSA and reach its peak on 2007. However after financial crisis, the arguments turned upside down that without central bank involvement in supervision and regulation of banking and financial system, liquidity and financial instability occurs because central bank does not possess up-to-date information on the condition of the banks (Eichengreen and Dincer, 2011). In fact, the authority to supervised bank is returned from FSA to Bank of England in 2010-2011 while FSA start to focus on consumer protection (Ferran 2011).

Figure 2. Share of Independent Bank Supervisors and Central Bank Supervisors.



Source: Eichengreen and Dincer (2011)

The most recent notable study in the structure of bank supervision is Eichengreen and Dincer (2011). They assemble data on the structure of bank supervision as many as 140 countries for the period 1998-2006 in order to understand the choice of supervisory structure and its effect on financial variables. The main result of their paper is that countries with the presence of independent supervision located outside the central bank is associated with fewer nonperforming loans as a share of GDP, the banking system require to hold less capital against asset, higher deposit rate, and that those countries are less prone to systemic banking crisis.

Chapter 3: Data and Methodology

3.1 The Data and Samples

The dataset used in this study is compiled from three main sources: (1) WBES -the 2000 World Business Environment Survey- broad level data from over 9.000 firma in 80 countries; (2) the Barth et al. (2006) dataset on bank supervision and regulation in 152 countries; (3) World Development Indicators for macro indicators in the transition economies.

As summarized in Beck et al. (2006) and Barth et al. (2009), there are three advantages in using the WBES data to study bank corruption. First, it provides direct information on the degree to which firms perceive corruption in lending to be an obstacle. Second, the surveyed firms vary in size, ownership (both public and private), industrial sector, and organizational structure. In particular, the dataset covers a large proportion of small- and medium-size private enterprises, whereas most other cross-country studies focus exclusively on large, publicly listed firms. Third, the firm-level survey data allow us to control for firm-specific characteristics and hence to draw appropriate inferences about the relationships between media ownership, concentration and bank corruption.

In order to synchronize the dataset, we choose to use country-level data from 2004 because most of data which taken from Barth et al (2006) are from 2004 and also by using this specific years we can avoid the bias from European debt crisis in the recent years which can be considered hugely affect our country samples especially in Eastern Europe.

For the range of dataset, after we synchronize three different available dataset, we have around 2000 observations from 21 transition countries of Eastern Europe and Central Asia. Countries that will be covered on this study are: Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Turkey, and Ukraine.

3.2 Methodology

To assess the impact of bank supervisory approaches and structures on the degree of corruption in bank-firms relations while controlling for firm-specific and country-specific factors, we estimate regressions of the following term:

$$Bank\ Corruption_{j,k} =$$
$$\alpha + \beta' Firm\ Controls_{j,k} + \gamma_1 Supervisory\ Power_k + \gamma_2 Private\ Monitoring_k +$$
$$+\theta' Structure\ of\ Supervisor_k + \delta' \text{Institutional Quality}_{\text{j}} + \varphi' Macro\ Controls_{\text{k}} + \varepsilon_{j,k} \qquad (5)$$

The j and k subscripts indicate firm and country, respectively. Firm controls contain every variable from WBES which has relation with the dependent variable following Beck et al (2006). Supervisory power and private monitoring represents bank regulatory and supervisory indicators in country. Structure of Supervisor is the dummy variable for the option to choose central bank as bank supervisor and to measure the degree of independence for bank supervisor. Institution Quality variables were taken from Kauffmann et al. (2006) as control variables. Macro Controls contains various variables which measure economics, banking, and financial performance of a country. Detailed explanations on these groups of variable will be delivered later on this part.

Unlike the underlying variable, the observed dependent variable, $Bank\ Corruption_{j,k}$, is polychotomous variable with a natural order. Specifically, a firm classifies corruption in lending into 4 categories, with 3 threshold parameters, λ. Considering the nature of cross-section behavior on our dataset, we therefore use the ordered probit (oprobit) model to estimate the λ-parameters together with the regression coefficients simultaneously. However, it is important to keep in mind that the magnitude of the ordered probit coefficients cannot be interpreted as marginal effects of a one-unit increase in the independent variable on the dependent variable, given the non-linear structure of the model, although the sign and statistical significance of the coefficients are similar to regression interpretation.

To avoid endogeneity problem, for example caused by strong correlation between *bank corruption* as dependent variable and *supervisory power* as independent variable that will make the result bias due to multicollinearity. We first check the correlation between variables using pairwise correlation method and the result can be seen in table 1B for firm level data and table

1C for country level data. In both table, most variables have weak correlation except two variables which measure institutional quality. However, since both variables did not have strong correlation with dependent variable and another important independent variable such as the structure of bank supervision and supervisory power, we still can assume that our result did not bias because of this correlation problem.

Stata version 12 was used in this study to perform econometric simulation..

3.3 Variables

3.3.1 Bank Corruption

The dependent variable in this analysis is the measure of bank corruption. We follow the work of Beck et al. (2006), Barth et al. (2009), and Houston et al. (2011) to construct the measure of corruption using data from WBES. Specifically, it is based on the key question concerning bank corruption in the survey. The question takes the following form: "Is corruption of bank officials an obstacle for the operation and growth of your business?" Answers may vary between 1 (no obstacle), 2 (a minor obstacle), 3 (a moderate obstacle) and 4 (a major obstacle). Therefore, a higher value indicates more severe corruption in lending.

We consider this variable as the best proxy to estimate the degree of corruption in lending at least for three reasons. First, this variable can explain directly the degree of problem faced by firms when they have to deal with corrupt bank officials. In other words, this variable specifically explain about corruption in banking sector while most data source normally addressing more general corruption level especially in government institutions. The most recent dataset collected by The World Bank such as Business Enterprise Survey or The Business Environment and Enterprise Performance Survey (BEEPS) include corrupt bank officials as one obstacle to obtain finance other than collateral, interest rate, lengthy procedure to obtain loan, and problem in contract. However using this kind of variable make it difficult to measure the degree of corruption in lending because we need to create weaker qualitative variable with value 1 it obstacle are corrupt bank officials and 0 for other obstacle. Therefore using the Bank Corruption variable from WBES has gave us strong stand as a best proxy to measure corruption in lending.

Second reason why we choose this variable is because we believe that self-reported data resulted from survey have less bias in result although we can only rely on the information provided by firms due to difficulties to obtain exact value of corruption level in banking sector. Beck et al. (2006) also give detailed explanation for why they believe that these self-reported data are not biasing the results in favor of their findings. They argue that if a firm facing the same obstacles responds to questions differently in different institutional environments, then, to the extent that this represents pure measurement error, it would bias the results *against* finding a significant relationship between competition, information sharing and firm financing obstacles. Lending further support to their argument, Beck et al. (2006) obtain the same key results even after controlling for a wide range of country-specific traits.

Finally, existing papers using the same database show that firms' responses to the survey on financing obstacles are capturing more than idiosyncratic differences in how firms rank obstacles; the survey data are associated with measurable outcomes in terms of efficiency of investment flows, firm growth, corruption and property rights, as shown in several recent and influential studies (see Barth et al., 2009 for a review and discussion). Likewise, Beck, Demirguc-Kunt and Peria (2007) show that across countries, an objective measure of the degree of access to and use of banking services is closely related to the WBES measure of firm financing obstacles.

3.3.2 The Structures of Bank Supervisor

We follow Eichengreen and Dincen (2011) to build dependent variable on the structure of bank supervisor. The structure of bank supervision can be determined whether or not supervisory responsibility rests principally with the central bank and the independency of the supervisory agency itself.

We measure the first category by using dummy variable with value 1 if the supervisor is central bank and 2 otherwise. While to measure the degree of independency, we follow Barth et al. (2006) which make three categories 1 for low independency, 2 for medium independency, and 3 for high independency.

To collect the data, we try to examine central bank websites, which indicate whether or not the central bank is charged with such responsibilities. We also cross checked the resulting

information with independent descriptions on the website of the Bank for International Settlements and Masciandero, Quintyn and Taylor (2008).

3.3.3 Bank Supervision and Private Monitoring

Beck et al. (2006) examine the role that bank supervision plays in combating lending corruption. They find that strengthening traditional official supervision does not have a positive impact on the integrity of bank lending, but instead, a supervisory strategy that focuses on empowering private monitoring of banks through the disclosure of accurate and timely information reduces lending corruption.

Official Supervisory Power is constructed from a series of dummy variables that indicate whether bank supervisors can take specific actions against bank management, bank owners, and bank auditors both in normal times and times of distress. This measure includes information on whether the supervisory agency can force a bank to change its internal organizational structure, suspend dividends, stop bonuses, halt management fees, force banks to constitute provisions against actual or potential losses as determined by the supervisory agency, supersede the legal rights of shareholders, remove and replace managers and directors, obtain information from external auditors, and take legal action against auditors for negligence. A high value of this measure indicates wider and stronger authority for bank supervisors.

Private monitoring is the principal component indicator of nine dummy variables that measure whether bank officials are legally liable for the accuracy of disclosed information; whether banks disclose information such as consolidated accounts, off-balance sheet items, accrued, unpaid interest/principal of non-performing loan and/or risk management procedure to the public; whether banks must be audited by certified international auditors; whether largest 10 banks are rated by international and domestic rating agencies; whether subordinated debt is allowable as part of capital, and whether there is no explicit deposit insurance system and no insurance was paid the last time a bank failed. A high value of this measure indicates more tools and incentives for private bank creditors to monitor banks.

3.3.4 Firm Characteristics and Controls

Barth et al. (2009) find that ownership structure of the firm is associated with the existence of bribery payments. Following that argument, we include two independent dummy variables that identify a firm's ownership type. *Government* equals 1 if any government agency or state body has a financial stake in the ownership of a firm, and 2 otherwise. *Foreign* equals 1 if any foreign investor has a financial stake in the ownership of a firm, 2 otherwise.

In addition based on Beck et al (2006), we also include several other enterprise-level controls. *Sales* are measured by the natural logarithm of total sales. *Competitor* is the number of competitors in the firm's main business line, where value 1 is for no competitor, 2 if there are 3 or fewer competitor, and 3 if the competitors in the market is more than 3. *Exporter* is a dummy variable which takes on a value 1 if the firm exports, and 2 otherwise.

Finally, we use *General financing obstacle* as an additional control variable based on the question about general opinion measuring difficulties to obtain loan from banks with value 1 – 4 where higher value means higher obstacle. As Beck et al. (2006) and Barth et al. (2009) point out, incorporating this additional control variable enables us to establish that the link we find is with corruption, not with overall complaints about the financial sector.

3.3.5 Institutional Quality

As mentioned before, the quality of institution may play big role in determining corruption level in single country. Low level of institution quality might be associated with higher possibility of corruption including in banking sector. So it is important to include variables that can measure the degree of institution quality. To measure the institutional quality, we use two variables as a control for firm-level variables and two more variables as a control for country level variables. Our model try to predicts that an improved institutional quality will discourage bank-lending corruption

For firm-level variables, we add control variables which capture the perspective of the firm's on law and general financing obstacle which taken from WBES. The first variable is based on a question that asks about the fairness and impartiality of the court system in resolving business disputes (*Court Fairness*). The second variable is based on a question that asks about the enforceability of a court's decision (*Law Enforcement*). The survey offers respondents six choices: 1 (never), 2 (seldom), 3

(sometimes), 4 (frequently), 5 (usually), and 6 (always). A larger number represents a better system in terms of fairness and enforceability.

Furthermore, we include a series of other political and institutional quality indexes from World Governance Indexes compiled by Kaufmann et al. (2006) as a check on the robustness of the results. The World Governance Indexes are constructed based on 276 individual variables taken from 31 different sources produced by 25 different organizations. We use two main indexes to measure dimensions of governance and institutional quality. First is government effectiveness with higher values mean higher quality of public and civil service. Second is rule of law with higher values mean stronger law and order. Data from 2004 were taken for these institutional quality variables and detailed definitions of these indexes can be found in appendix 1.

3.3.6 Country-Level Control Variables

Our empirical analysis also includes several country-level variables to control for differences in economic development and institutions across countries. Specifically, we use three kind of control for our result and all country-level data were obtained from World Development Indicators from The World Bank and Barth et al. (2006).

The first one is macroeconomic development controls which contain three variables. First, is economic *growth* which measures the performance of economics. The second variable is *inflation* as percentage change in the consumer price index value. The last one is *GDP per capita* as a measure of wealthy. We use logarithm form in order to avoid measure unit problem with the other variables.

Second, we use three variables for controls of banking system. *Government bank ownership* is the fraction of the banking system's asset in banks that are 50% or more owned by government. Bank *barrier to entry* measure the stringency of entry requirements into banking industry. This variable were constructed on the basis of eight questions regarding whether types of legal submissions are required to obtain a banking license, with higher value indicating greater stringency. As an addition, we also include commercial banks and other *lending* to measures general level of lending. It should be noted that the amount of lending here is not only for productive loan, it also include consumer lending and other type of lending. Higher *lending* values mean that the banking system has channeling more fund to the market.

At last, we use ratio of *stock traded per GDP* to measure the financial development and performance of country which we analyzed. *Credit per GDP* also included as financial control to show the easiness of obtaining credit for private sector with higher values mean firm has relatively easier access to bank loans.

These control variables were used in order to avoid misleading conclusion due to possible relation that a country with bad economic, banking, and financial performance will tend to have higher rate of corruption in lending. By using these variables, we expect that the result of our study will be more objective.

Chapter 4: Empirical Result

4.1 Bank Supervision and Corruption in Lending

The first step in this analysis is to assess the impact of bank supervision on corruption in lending, we assume that the firm's underlying response can be described by the following equation:

$$Bank\ Corruption_{j,k} =$$
$$\alpha + \beta_1 Government_{j,k} + \beta_2 Foreign_{j,k} + \beta_3 Exporter_{j,k} + \beta_4 Competitors_{j,k} + \beta_5 Sales_{j,k} +$$
$$\gamma_1 Supervisory\ Power_k + \gamma_2 Private\ Monitoring_k + \delta_1 \text{Fair Court}_{\text{j,k}} + \delta_2 \text{Law Enforcement}_{\text{j,k}} +$$
$$\varphi_1 Growth_{\text{k}} + \varphi_2 Inflation_{\text{k}} + \varepsilon_{j,k} \quad (6)$$

The j and k subscripts indicate firm and country, respectively.

The most important finding of this part can be seen in Table 2 when follow the work of Beck et al. (2006) to see the relation between supervisory power view and private monitoring view to corruption in lending. The results are consistent with Beck et al. (2006), Barth et al. (2009), and Houston et al. (2011) that official *Supervisory Power* is positively associated with corruption in bank lending while *Private Monitoring* is negatively associated with corruption in lending

The supervisory power view predict that more powerful supervisory agencies can improve the governance of banks and thereby minimize the degree of bank corruption as an obstacle to raising external finance. Because without strong supervisory power, the information cost, transaction cost, and government policies will create an opportunity to bank officials to ask for additional fee or receive bribe from potential borrowers.

Contrary with this view, *supervisory power* always has significant value but never enter negative signs in any of the regressions. It means supervisor that have the power to oversee and discipline banks do not lower the degree of corruption in lending. This result also prove that when supervisor has bigger authority it will create a tendency for politicians or banks to capture official supervisor to abuse their authority in channeling funds from banks to certain firms thus intensifying the financing obstacles faced by the firm.

In the other hand, from Table 2 we found that *private_monitoring* variables has negative signs and significant for all regression result. This result support private empowerment view and it

means that corrupt bank officials are less of a barrier to raising capital in countries where supervisory policy force banks to disclose accurate information and give private creditors the appropriate incentives. Moreover, this is not support for *laissez-faire* but to give pressure for supervisor to urge banks to disclose accurate information and gives incentives to private agents to monitor banks.

The macroeconomic controls that we use in this set of regression also show consistent result with our prediction as can be seen in table 2. *Growth* variable has negative and significant coefficients in all regression. It means that a country with higher economic growth will experience lower degree of bank corruption. As for *Inflation* variable, we found positive and highly significant coefficients in all regression. It means that a country with higher level of inflation will also face higher degree of bank corruption.

From table 2 we also can define the relation between firm-level variables with bank corruption. The coefficient of *Government Ownership* has positive and statistically significant (at the 1% level) in all model specification while we can't find significant correlation between *Foreign Ownership* and corruption in lending. Positive sign in this variable means that if the firm not owned by government the corruption in lending is more likely higher, so in the other words we can say that government-owned firms are less likely to rate bank corruption as an obstacle to growth. We expect that high level of significance for government-owned firms have more government connections, soft-budget constraints, and stronger bargaining power suffer less from corruption.

The others firm characteristics also have some impact on corruption in lending. *Sales* variable are not consistently have a negative and significant relation to corruption in lending. We may say that higher amount of sales will ease the firm from financing obstacle thus will reduce the corruption in lending, but this deduction cannot hold in every case. *Exporting* firms are associated with less corruption in lending, as indicated by the positive and statistically significant coefficients in all model specifications. If the country did not export their product, positive sign tells us that the chance of existence of corruption in lending would be higher. However, we do not find a significant relationship between firm competition and corruption in lending.

Furthermore, to measure the institutional quality in the firm level, we also found consistent prediction for the coefficients of *Court Fairness* and *Law Enforcement which* are positive and statistically significant. The result for these variables indicating that lower levels of legal environment and contract enforcement will increase the tendency of corruption in lending.

Finally, the result in table 2 is also consistent after we include control variable *General Financing Obstacles*, which equals each firm's response to the question: How Problematic is financing for the operation and growth of your business?" While including this firm-specific response may induce simultaneity bias by adding the independent variable that is a priori likely to be highly correlated and co-determined with the dependent variables, the aim of adding this variable is to reduces the likelihood that reporting biases or interpretational differences across firms that derive relation between bank supervisory approaches and corruption in lending which part of obstacle in financing. As we expect, this control variable are positively associated with corruption in lending, as indicated by the positive and statistically significant (at the 1% level) coefficients, indicating that our finding is not biased by complaints of firm managers about the overall financial constraint.

4.2 The Structure of Bank Supervisor and Corruption in Lending

In Table 3 we add the structure of supervisor in the baseline models. As discussed previously, we define two variables to measure the degree of structure of supervisor. First variable is *Central Bank as Supervisor* and the second one is *Independency of Bank Supervisor,* detailed definitions of these variables can be found in chapter 3. The complete empirical model can be expressed as follows:

$$Bank\ Corruption_{j,k} =$$
$$\alpha + \beta_1 Government_{j,k} + \beta_2 Foreign_{j,k} + \beta_3 Exporter_{j,k} + \beta_4 Competitors_{j,k} + \beta_5 Sales_{j,k} +$$
$$\gamma_1 Supervisory\ Power_k + \gamma_2 Private\ Monitoring_k + \delta_1 \text{Fair Court}_{\text{j,k}} + \delta_2 \text{Law Enforcement}_{\text{j,k}} +$$
$$\theta' Structure\ of\ Supervisor_k + \varphi' Macro\ Controls_{\text{k}} + \varepsilon_{j,k} \qquad (7)$$

The j and k subscripts indicate firm and country, respectively.

To this set control of variables, the first regression adds *Central Bank as Supervisor,* and the second one adds *Independency of Bank Supervisor.* The third regression adds both variables simultaneously.

One of the main originality of this paper is the possibility to see the relation between the structure of bank supervisor and corruption in lending. The variable of *Central Bank as Supervisor* show positive and consistent significant coefficients in every regression result. This positive sign means that if bank supervisor is not the central bank, the degree of corruption in lending will be higher. The other firm-level and country-level variables are consistent with various result but we found lower significance for private monitoring.

We suggests that if a country opt out the supervisor authority from central bank, it tends to give higher authority to supervising bank and reduce the incentives for private agents to monitor bank activities. Therefore, although growing trend shows increasing number of country to transfer the authority to supervise bank from central bank, it doesn't means the obstacle in financing especially corruption in lending will be lower. These results in table 3 are quite consistent with our prediction based on Eichengreen and Dincer (2011) which criticized arguments that support the assignment of bank supervisor authority to agency separate from central bank.

Unfortunately, from Table 3 we can't find clear arguments for independency of bank supervisor that support our prediction. Based on Eichengreen and Dincer (2011), non central bank independent supervisor will have lower nonperforming loans, their banks are able to hold less capital as share of asset, and their deposit rates are higher indicating better returns for savers which also indicating less financial repression and less banking-sector intervention by the government in pursuit of other objectives. So ideally, we expect negative and significant coefficient from this variable on independency of bank supervisor.

However, in Table 3 the coefficients is positive and not significant in the second regression and turn to be negative and significant in the third regression when we add both variables of the structure of bank supervisor together. The third regression means that, higher independency of bank supervisor will reduce the corruption in lending if we include control of bank central as supervisor. But again, we have problems that in this third regression the coefficient for private monitoring is not significant. Therefore it is hard to make conclusion for the relation of independency of bank supervisor to corruption in lending.

4.3 Nonlinear Effect & Interactions Terms

Although for most of the result we have clear interpretation, we need to be careful because there are tendency of nonlinear relationship and endogeneity between the structure of bank supervision and supervisory policy that further on affect corruption in lending. The idea is that a country with under developed economics, law, and financial institution face higher possibility of higher

corruption in lending. That is, effective institutions may reduce the ability of supervisory agencies to promote private, rather than public interest. The choice of using transition economies in this research have possibility to increase the degree of problem that may occur, because most transition economies have lower institutions quality. However, follow the work of Beck et al (2006) and Houston et al. (2011) we can check nonlinearity adding squared form of the structure of bank supervision variables and use interactions terms between the structures of bank supervisor and supervisory policy to reduce this problems.

Our conclusion remain the same even after we check for the nonlinearity as we can see the result in table 4 regression 1,2, and 3. Previous result hold that our squared variable for *central bank as supervisor* are positive and significant means that if the bank supervisor is not central bank it will increase the possibility of corruption in lending. Again for squared *independency* of bank supervisor we do not have clear sign and significance, in regression 3 we have negative value that in line with our prediction that higher independency will decrease the level of corruption in lending. But since the value is insignificance, we cannot take any further conclusion.

Furthermore, in Table 4 (regression 4 and 5) we include this interaction terms to test for possible nonlinear relationship between the structure of bank supervision, supervisory policies, and corruption in lending. We find that for interaction between central bank as supervisor to supervisory power and private monitoring, the private monitoring increases the integrity of bank lending in countries with involve bank central as the bank supervisor. Besides that, supervisory power doesn't have a significant positive effect of bank lending, whether the central bank is the supervisor or not.

In regression 5 from table 4, we find that the independency of bank supervisor is strong means that higher independency of bank supervisor will reduce the degree of bank corruption while the coefficients signs for both supervisory power and private monitoring are consistent with previous result. However, in the interaction process, it is hard to take clear conclusion from the result. The interaction term for independency and supervisory power suggesting that independent supervisor with higher authority are able to reduce the level of corruption in lending. While the regression result has gives no support for private monitoring because the insignificant value of interaction between independency and private monitoring.

4.4 Robustness to Control other Country-Specific Factors

Although table 2, 3 and 4 results hold when controlling for firm-specific and country-specific traits, there may exist concerns that the supervisory variable are proxying for other country-specific factors. Countries with different characteristics may choose different supervisory practices. At the same time these different country-specific traits may determine the integrity of bank lending. Therefore, in this part we try to assess whether some third factor is driving both the selection of the supervisory policies and the financing obstacles reported by firms.

There are several things that we can find from the regression results in Table 5. First, it supports further private monitoring view when the majority of regression shows negative and significant coefficients. Second, the supervisory view is not supported by the result thus higher supervisory authority means higher degree of corruption in lending. Third, central bank as supervisor variable has positive and significant coefficient in every regression in table 4. It means that the degree of corruption in lending will be lower in the country which has central bank as their supervisor. Fourth, surprisingly we found negative and significant coefficient for independency of bank supervisor in almost every regression result. It means that higher level of independency of bank supervisor will decrease the degree of corruption in lending. This last finding can support arguments from Eichengreen and Dincen(2011) which have a favor for independent supervisory agency.

Besides that, we also found that institutional quality which measured by *government effectiveness* and *rule of law* indexes has constant negative value but insignificant. It means that while we can expect better institutional quality will lead to lower level of corruption in lending, the insignificant value in Table 4 shows that perhaps most of the country which covered in this study did not have good institutional quality. This problem occur because we focus our study in transition economies in Eastern Europe and Central Asia where generally have low level of institutional quality and proved by low level of both *government effectiveness* and *rule of law* indexes. To support the argument, Beck et al. (2006) in their research also found insignificant value for government effectiveness and weak significance ($p < 0.1$) for rule of law but both variables has negative signs.

Furthermore, for each country level variables we found some interesting evidence from Table 4.. These country level variables can be distinguished into three categories. First are bank attribute country variables which include percentage of government ownership in banking system, barrier to entry for new bank, and the value of commercial lending of banking sector. We find that these three variables support previous result for the structure of bank supervisor and supervisory policy. Furthermore, higher level of government ownership will increase the degree of corruption in lending. Positive and significant coefficient for *Entry Barrier* means that higher level of entry barrier will also increase the degree of corruption in lending. The amount of bank lending has positive and significant coefficients which means that higher amount of lending in on country will have a tendency of higher degree of corruption in lending.

Second group of country-level variable is macroeconomic variables. Although we already have *growth* and *inflation* as part of this group, we also need to add GDP per capita so our conclusion will not misleading. In table 4 the coefficient for GDP per capita is negative and significant which means that country with higher GDP per capita will have lower degree of corruption in lending. The results are in line with Svensson (2005) which finds evidence that higher GDP per capita is related to less corruption.

Last group of country-level variables is financial development. We take two different variables to control the result which are the ratio of stock traded per GDP and the ratio of credit to private sector per GDP. We find that the regression result which involve stock per GDP strongly support previous result which strengthen private monitoring, support central bank as supervisor, and promote independency of bank supervisor. The sign for this variable is positive and significant indicating that higher level of stock traded per GDP has a tendency to increase the bank corruption. While for the second variable we have negative and significant coefficients which mean that firms in a country which has higher rate of credit to private sector experience lower cost of financing and furthermore lowering the corruption in lending.

In a glimpse, these two financial development indicators may seem to be not in the same line because we initially predict that both variables should have same negative sign. Higher credit to private sector indicate that the firm has less constraint when they borrow from bank and also bank has confidence to channeling more fund to productive project. However, higher stock traded per GDP has more complex attributes since we believe that institutional quality play a

bigger role. As mentioned by Chin and Ito (2005), in the emerging market countries, a lower level of bureaucratic quality, and high level of corruption lowering the effect of financial openness in fostering the development of equity market. Therefore if we look back to the insignificant value of institutional quality, we may assume that this low level of institutional quality affect the behavior in higher level of stock traded GDP has a tendency to increase the bank corruption.

These two variables give us sign that the corruption in lending also has a possibility to occur in the country with advance financial system but don't have solid institutional quality. Only when country can increase their efficiency of giving credit or in the other words easing the obstacle in financing, they can reduce the degree of corruption in lending.

Chapter 5: Conclusion

This research try to examine the relation between bank supervisory and corruption in lending based on the data from 21 transition economies in Eastern Europe and Central Asia. This research further support the arguments on corruption in lending from Beck et al (2006), Barth et al (2009) and Houston et al. (2011) and the structure of bank supervisor by Eichengreen and Dincer (2011)

We found that higher supervisory power which gave bigger authority to supervised bank including to the influence the decision to channeling fund may have causing higher degree of corruption in lending. Therefore this research did not support supervisory power view that give more authority which initially try to reduce transaction cost, information cost, government policies cost, and potential banking crisis. Furthermore this paper support private monitoring view that supervisory agency should push banks to disclose accurate information and give incentives to private agents to monitor bank in order to reduce the degree of corruption in lending which finally be able to reduce the level of obstacle in financing.

The most important result from this research is that the structure of bank supervision significantly has an effect to corruption in lending, especially for the option of choosing central bank as bank supervisor. We found that if the bank supervisor function is not in the bank central, the possibility of higher corruption in lending will increase. Therefore, this point of view criticize the trend of separating bank supervision function from central bank which started by UK's Financial Service Stability in 1998.

Finally, we also have found that if we control with various country-level variables, the independency of bank supervisor will decrease the degree of corruption in lending. Although we realize that for this independency variable, some indicator shows inconsistent result which could be caused by nonlinear interactions between independent and dependent or misjudgment to define the right measure of bank supervisor independency variables.

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Appendix I: Variables and Source

Variable	Definition	Original Source
Bank Corruption	Is corruption of bank officials an obstacle for the operation and growth of your business. (1-no obstacle, 2-minor obstacle, 3-moderate obstacle, 4-major obstacle)	World Business Environment Survey (WBES, 2000)
Competition	Regarding your firm's major product line, how many competitors do you face in your market?	WBES, (2000)
Credit per GDP	Ratio of total credit to private sector per GDP in 2004	World Development Indicators.
Bank Lending	Logarithm of commercial bank's values and other Lending	World Development Indicators.
Bank Entry Barrier	Entry into Banking Requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. Which of the following are legally required to be submitted before issuance of the banking license? (1)Draft by-laws? (2)Intended organization chart? (3) Financial projections for first three years? (4) Financial information on main potential shareholders? (5) Background/experience of future directors? (6) Background/experience of future managers? (7) Sources of funds to be disbursed in the capitalization of new bank? (8) Market differentiation intended for the new bank? The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency	Barth et al (2006)
Central Bank as Supervisor	A dummy variable takes on the value 1 if central bank acts as a supervisor authority, 2 otherwise.	Barth et al (2006) & Bank of International Settlement
Exporters	This dummy variables takes on the value 1 if firm exports; 2 otherwise.	WBES, (2000)
Entry Barrier	Entry into Banking Requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. Which of the following are legally required to be submitted before issuance of the banking license? (1)Draft by-laws? (2)Intended organization chart? (3) Financial projections for first three years? (4) Financial information on main potential shareholders? (5) Background/experience of future directors? (6) Background/ experience of future managers? (7) Sources of funds to be disbursed in the capitalization of new bank? (8) Market differentiation intended for the new bank? The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency.	Barth et al. (2006)
Foreign	Dummy variable equals to 1 if any foreign company and individual has a financial stake in the ownership of the firm, 2 otherwise. .	WBES, (2000)
Fair Court	"In resolving business dispute, do you believe your country' court system to be fair and impartial, categorical variable, 0-never, 1-seldom, 2-sometimes, 3-frequently, 4-usually, 6-always. Higher value indicates better court quality.	WBES, (2000)
GDP Per Capita	Logarithm of gross domestic product per capita in 2004	World Development Indicators
General Financing Obstacle	How problematic is financing for the operation and growth of your business? (1-no obstacle, 2-a minor obstacle, 3-amoderate obstacle, 4-a major obstacle).	WBES, (2000)

Government Bank Ownership	The fraction of the banking system's assets in the banks that are 50 percent or more owned by government.	Barth et al. (2006)
Government	Dummy variable equals to 1 if any government agency or state body has a financial stake in the ownership of the firm, 2 otherwise.	WBES, (2000)
Government Effectiveness	Principal component indicator of survey indicators measuring the competence of bureaucracy and the quality of public service delivery	Kaufmann et al. (2006)
Growth	Growth rate of GDP in 2004	World Development Indicators
Inflation	Growth rate of Consumer Price Index in 2004	World Development Indicators
Independency of Bank Supervisor	Degree of Supervisory Independence. (1-Low Independence, 2-Medium Independence, 3-High Independence).	Barth et al (2006) & Bank of International Settlement
Law Enforcement	"In resolving business dispute, do you believe your country' court system to be decision enforced?" categorical variable, 0-never, 1-seldom, 2-sometimes, 3-frequently, 4-usually, 5-always. Higher value indicates better law enforcement.	WBES, (2000)
Supervisory Power	Principal component indicator of 14 dummy variables: 1.Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank? 2. Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in elicit activities, fraud, or insider abuse? 3. Can supervisors take legal action against external auditors for negligence? 4. Can the supervisory authority force a bank to change its internal organizational structure? 5. Are off-balance sheet items disclosed to supervisors? 6. Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? 7. Can the supervisory agency suspend the directors' decision to distribute: a) Dividends? b) Bonuses? c) Management fees? 8. Can the supervisory agency legally declare-such that this declaration supersedes the rights of bank shareholders-that a bank is insolvent? 9. Does the Banking Law give authority to the supervisory agency to intervene that is, suspend some or all ownership rights-a problem bank? 10 .Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: a) Supersede shareholder right? b) Remove and replace management? c) Remove and replace directors?	Barth et al. (2006)
Private Monitoring	Principal component indicator of nine dummy variables that measure whether bank officials are legally liable for the accuracy of disclosed information; whether banks disclose information such as consolidated accounts, off-balance sheet items, accrued, unpaid interest/principal of nonperforming loan and/or risk management procedure to the public; whether banks must be audited by certified international auditors; whether largest 10 banks are rated by international and domestic rating agencies; whether subordinated debt is allowable as part of capital, and whether there is no explicit deposit insurance systems and no insurance was paid the last time a bank failed.	Barth et al. (2006)
Rule of law	Principal component indicator of survey indicators measuring the quality of contract enforcement, the police and the courts, as well as the likelihood of crime and violence	Kaufmann et al. (2006)
Sales	Logarithm of Firm Sales	WBES, (2000)
Stock per GDP	Ratio of stock traded value per GDP in 2004	World Development Indicators.

Appendix II: Tables of the Result

Tabel 1A. Summary Statistics

Variables	Mean	St. Dev	Minimum	Maximum	Observation
Firm-level variables					
Bank Corruption	1.87833	1.134387	1	4	2252
Government	1.766756	0.4229907	1	2	2252
Foreign	1.912966	0.2819471	1	2	2252
Exporter	1.698934	0 .4588231	1	2	2252
Sales	3.528863	3.335199	1	14	2252
Competitors	2.669183	0.6518747	1	3	2252
Fair Court	3.792629	1.41361	1	6	2252
Law Enforcement	3.682504	1.501072	1	6	2252
General Financing Obstacle	3.022647	1.076349	1	4	2252
Country-level variables					
Supervisory Power	10.80952	2.561622	6	14	21
Private Monitoring	5.761905	1.480026	3	8	21
Government Bank Ownership	24.99238	27.03774	0	100	21
Bank Entry Barrier	14.09524	5.999206	6	23	21
Growth	3.875876	2.996723	-1.0882	9.3786	21
Inflation	3.005325	2.653548	-1.1912	9.0056	21
Central Bank as Supervisor	0.285714	0.46291	0	1	21
Independency of Bank Supervisor	0.904762	0.830949	0	2	21
Government Effectiveness	0.03003	0.67328	-1.1471	1.1582	21
Commercial Bank and Other Lending	8.850423	1.013931	7.1227	10.022	12
GDP per Capita	3.378199	0.408649	2.5101	4.0603	21
Stock Traded per GDP	7.112943	9.999206	0.0453	37.5928	17
Rule of Law	-0.14010	0.73716	-1.3153	1.11047	21

Table 1B: Correlation between Firm-Level Variables

	Bank Corruption	Government	Foreign	Exporter	Sales	Competitors	Fair Court	Law enforcement	General Financing Obstacle
Bank Corruption	1.0000								
Government	0.1139	1.0000							
Foreign	0.0599	-0.0027	1.0000						
Exporter	0.1413	0.1527	0.2438	1.0000					
Sales	-0.1264	-0.2014	-.01825	-0.2986	1.0000				
Competitors	0.0627	0.2156	0.0777	0.1080	-0.1340	1.0000			
Fair Court	0.1211	0.0986	0.0528	0.1407	-0.1429	0.0533	1.0000		
Law Enforcement	0.1385	0.0920	0.0250	0.0605	-0.0993	0.0497	0.3548	1.0000	
General Financing Obstacle	0.2300	-0.0137	0.1090	0.0273	-0.1121	0.0753	0.0901	0.0944	1.0000

Table 1C: Correlation between Country-Level Variables

	Bank Corruption	Central Bank as Supervisor	Independency of Bank Supervisor	Supervisory Power	Private Monitoring	Growth	Inflation	Government Bank Ownership	Bank Entry Barrier
Bank Corruption	1.0000								
Central Bank as Supervisor	0.0902	1.0000							
Independency of Bank Supervisor	-0.0528	0.2550	1.0000						
Supervisory Power	-0.0054	-0.3038	0.2532	1.0000					
Private Monitoring	-0.0185	-0.3550	0.0569	0.2147	1.0000				
Growth	-0.0659	0.0154	-0.4761	0.0256	-0.2396	1.0000			
Inflation	0.0901	-0.2471	-0.5350	0.0748	0.3938	0.5431	1.0000		
Government Bank Ownership	0.0884	0.0251	-0.0489	-0.1330	-0.1450	0.1615	0.2073	1.0000	
Bank Entry Barrier	0.0028	0.1035	0.0252	-0.1848	-0.2026	0.0636	-0.2037	0.1129	1.0000
Commercial Bank and Other Lending	0.0059	-0.2642	-0.1030	0. 2846	0.3270	0.3303	0.1534	-0.0900	0.4457
GDP per Capita	-0.1604	-0.3591	0.3984	0.3393	0.6132	-0.4613	-0.2726	-0.2951	0.0656
Stock Traded per GDP	0.0918	-0.3185	-0.0551	0.1768	0.0851	0.4198	0.2218	0.5853	0.4414
Bank Accounting	-0.0515	0.0201	-0.0165	0.4947	0.2819	-0.4966	0.4303	0.5563	0.2980
Government Effectiveness	-0.1475	-0.3478	0.4075	0.3085	0.5344	-0.5864	-0.3083	-0.5767	-0.0752
Rule of Law	-0.1606	-0.4098	0.4392	0.3081	0.6271	-0.6361	-0.2978	-0.4684	-0.1831

	Commercial Bank and Other Lending	GDP per Capita	Stock Traded per GDP	Bank Accounting	Government Effectiveness	Rule of Law
Commercial Bank and Other Lending	1.0000					
GDP per Capita	0.6079	1.0000				
Stock Traded per GDP	0.6030	0.2693	1.0000			
Bank Accounting	-0.2847	-0.1708	-0.0317	1.0000		
Government Effectiveness	0.0382	0.8841	0.0212	0.0457	1.0000	
Rule of Law	-0.0124	0.8588	-0.0617	-0.3134	0.9438	1.0000

Table 2. Supervision and Corruption in Lending

VARIABLES	(1)	(2)	(3)	(4)
Government Ownership	0.266***	0.282***	0.276***	0.330***
	(0.0679)	(0.0680)	(0.0681)	(0.0692)
Foreign Ownership	0.137	0.145	0.139	0.0605
	(0.103)	(0.103)	(0.103)	(0.105)
Exports	0.277***	0.237***	0.263***	0.288***
	(0.0636)	(0.0631)	(0.0639)	(0.0647)
Sales	-0.0180**	-0.0126	-0.0156*	-0.0116
	(0.00828)	(0.00825)	(0.00834)	(0.00851)
Number of Competitors	0.0247	0.0177	0.0199	-0.000630
	(0.0434)	(0.0435)	(0.0435)	(0.0441)
Fair Court	0.0672***	0.0657***	0.0702***	0.0633***
	(0.0204)	(0.0203)	(0.0204)	(0.0207)
Law Enforcement	0.103***	0.0954***	0.0951***	0.0876***
	(0.0187)	(0.0190)	(0.0190)	(0.0192)
Growth	-0.0258**	-0.0372***	-0.0422***	-0.0505***
	(0.0107)	(0.0128)	(0.0129)	(0.0131)
Inflation	0.0643***	0.0842***	0.0872***	0.0858***
	(0.0121)	(0.0158)	(0.0158)	(0.0160)
Supervisory Power	0.0284**		0.0333***	0.0266**
	(0.0119)		(0.0121)	(0.0123)
Private Monitoring		-0.0448*	-0.0573**	-0.0513**
		(0.0250)	(0.0254)	(0.0258)
General Financing Obstacle				0.272***
				(0.0266)
Observations	2,057	2,057	2,057	2,045
Pseudo R2	0.0330	0.0325	0.0340	0.0564

Standard errors in parentheses
*** p<0.01, ** p<0.05, *p<0.1

Table 3. The Structure of Bank Supervisor and Corruption in Lending

VARIABLES	(1)	(2)	(3)
Supervisory Power	0.0506***	0.0302**	0.0603***
	(0.0126)	(0.0128)	(0.0137)
Private Monitoring	-0.0395*	-0.0575**	-0.0330
	(0.0254)	(0.0254)	(0.0256)
Government Ownership	0.315***	0.278***	0.320***
	(0.0674)	(0.0668)	(0.0675)
Foreign Ownership	0.154	0.146	0.133
	(0.104)	(0.104)	(0.104)
Exports	0.248***	0.262***	0.259***
	(0.0640)	(0.0640)	(0.0643)
Sales	-0.00770	-0.0154*	-0.00790
	(0.00843)	(0.00834)	(0.00843)
Fair Court	0.0600***	0.0704***	0.0565***
	(0.0206)	(0.0204)	(0.0207)
Law Enforcement	0.104***	0.0957***	0.104***
	(0.0191)	(0.0190)	(0.0191)
Growth	-0.0502***	-0.0401***	-0.0566***
	(0.0130)	(0.0132)	(0.0134)
Inflation	0.112***	0.0903***	0.104***
	(0.0163)	(0.0168)	(0.0169)
Central Bank as Supervisor	0.434***		0.485***
	(0.0710)		(0.0764)
Independency of Bank Supervisor		0.0268	-0.0841*
		(0.0430)	(0.0466)
Observations	2,060	2,060	2,060
Pseudo R2	0.0416	0.0338	0.0423

Standard errors in parentheses
*** p<0.01, ** p<0.05, *p<0.1

Table. 4. Nonlinearity and interaction terms

VARIABLES	(1)	(2)	(3)	(4)	(5)
Supervisory Power	0.0506***	0.0321***	0.0553***	0.224***	0.103***
	(0.0126)	(0.0123)	(0.0129)	(0.0489)	(0.0210)
Private Monitoring	-0.0395	-0.0571**	-0.0327	0.651***	-0.132***
	(0.0254)	(0.0255)	(0.0257)	(0.137)	(0.0510)
Government Ownership	0.315***	0.278***	0.319***	0.323***	0.277***
	(0.0674)	(0.0668)	(0.0675)	(0.0677)	(0.0672)
Foreign Ownership	0.154	0.142	0.137	0.172*	0.160
	(0.104)	(0.104)	(0.104)	(0.104)	(0.104)
Exports	0.248***	0.264***	0.256***	0.243***	0.251***
	(0.0640)	(0.0639)	(0.0642)	(0.0644)	(0.0644)
Sales	-0.00770	-0.0157*	-0.00770	-0.00937	-0.0148*
	(0.00843)	(0.00833)	(0.00843)	(0.00850)	(0.00839)
Fair Court	0.0600***	0.0701***	0.0565***	0.0577***	0.0594***
	(0.0206)	(0.0205)	(0.0207)	(0.0207)	(0.0206)
Law Enforcement	0.104***	0.0955***	0.103***	0.103***	0.0862***
	(0.0191)	(0.0190)	(0.0191)	(0.0192)	(0.0192)
Growth	-0.0502***	-0.0410***	-0.0545***	-0.0876***	-0.0719***
	(0.0130)	(0.0130)	(0.0133)	(0.0145)	(0.0149)
Inflation	0.112***	0.0878***	0.108***	0.0858***	0.103***
	(0.0163)	(0.0162)	(0.0165)	(0.0175)	(0.0187)
Central Bank as Supervisor2 (Squared)	0.145***		0.157***		
	(0.0237)		(0.0248)		
Independency of Supervisor2 (Squared)		0.00607	-0.0324		
		(0.0189)	(0.0199)		
Independency of Supervisor					1.097***
					(0.287)
Central Bank as Supervisor				4.036***	
				(0.551)	
Central Bank as Supervisor*Supervisory Power				-0.113***	
				(0.0286)	
Central Bank as Supervisor*Private Monitoring				-0.377***	
				(0.0716)	
Independecy of Supervisor*Supervisory Power					-0.102***
					(0.0191)
Independecy of Supervisor*Private Monitoring					-0.00556
					(0.0339)
Observations	2,060	2,060	2,060	2,060	2,060

Standard errors in parentheses
*** p<0.01, ** p<0.05, *p<0.1

Table 5. Macro Controls and Corruption in Lending

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Central Bank as Supervisor	0.498***	0.496***	0.804***	0.607***	0.600***	0.344***	0.674***	0.309***
	(0.0667)	(0.0667)	(0.136)	(0.0716)	(0.0716)	(0.0701)	(0.0774)	(0.0716)
Independency of Supervisor	-0.0931**	-0.0769*	-0.276***	-0.0598	-0.0526	-0.0197	-0.107**	-0.0827**
	(0.0420)	(0.0413)	(0.0638)	(0.0425)	(0.0416)	(0.0420)	(0.0498)	(0.0412)
Growth	-0.0470***	-0.0532***	-0.189***	-0.0810***	-0.0776***	-0.0450***	-0.0711***	-0.0415***
	(0.0119)	(0.0122)	(0.0252)	(0.0151)	(0.0136)	(0.0119)	(0.0142)	(0.0119)
Inflation	0.0900***	0.109***	0.211***	0.0827***	0.0801***	0.0583***	0.116***	0.0179
	(0.0155)	(0.0152)	(0.0225)	(0.0155)	(0.0153)	(0.0161)	(0.0204)	(0.0192)
Supervisory Power	0.0455***	0.0445***	0.0496**	0.0146	0.0127	0.0563***	0.0363***	0.0873***
	(0.0121)	(0.0121)	(0.0211)	(0.0131)	(0.0129)	(0.0122)	(0.0128)	(0.0138)
Private Monitoring	-0.0476**	-0.0646***	-0.120***	-0.120***	-0.120***	0.0613**	-0.0567**	0.0102
	(0.0228)	(0.0219)	(0.0357)	(0.0236)	(0.0237)	(0.0287)	(0.0280)	(0.0244)
Government Bank Ownership	0.00273**							
	(0.00111)							
Bank Entry Barrier		0.000458*						
		(0.000238)						
Commercial Banks and Other Lending			0.343***					
			(0.0551)					
Rule of Law				-0.0519				
				(0.0464)				
Government Effectiveness					-0.0494			
					(0.0458)			
GDP per Capita						-0.320***		
						(0.0482)		
Stock traded per GDP							0.0173***	
							(0.00280)	
Credit to Private per GDP								-0.0214***
								(0.00316)
Observations	2,487	2,487	2,271	2,271	2,271	2,487	2,067	2,487
Pseudo R2	0.0183	0.0179	0.0292	0.0218	0.0218	0.0249	0.0253	0.0254

Standard errors in parentheses
*** p<0.01, ** p<0.05, *p<0.1